



PS-58

SERVICE MANUAL

English
Deutsch
Français

No. 109



(Black)



(Rose or Walnut)

SPECIFICATIONS

Type	2-speed direct drive system
Platter	Aluminum alloy die-cast, 308mm outer diameter, weight 1.6kg
Motor	For platter drive: Brushless DC servo direct drive motor For full automatic mechanism drive: 16-pole geared motor
Speed	33-1/3 and 45rpm
Pitch control range	± 2.5%
Speed change system	Electronic change-over system
S/N	60dB (at 50,60Hz)
Wow & flutter	0.025%WRMS
Tone arm	Static balance type, tubular
Head shell	Plug-in type (European standard type)
Overall length	301mm
Effective length	220mm
Overhang	15mm
Tracking error	2°
Adjustable force range (scale) ...	0-3g/1 turn of the scale ring (directly readable in 0.2g steps)
Acceptable cartridge weight	4-10g
When a HITACHI cartridge is attached.	
Cartridge	Vertical moving magnet type (VFS-261)

Frequency response	20-20,000Hz
Output voltage	3.5 mV at 1 kHz 50 mm/sec.
Channel difference	1 dB at 1 kHz
Channel separation	20 dB at 1 kHz
Tracking force	2g (recommended)
Stylus tip	0.7 mil' diamond stylus (DS-ST26)
Power source	120V/60Hz for U.S.A. standard & CANADA standard 220V/50Hz for Europe standard 240V/50Hz for United Kingdom standard & Australia standard
Power consumption	5 watts (at 120V) 5 watts (at 220V) 6 watts (at 240V)
Dimensions	477(W) x 369(D) x 168(H) mm
Weight	9.2kg (20.2 lbs.)
Other devices	auto in, auto return, auto cut, antiskating, tracking force, direct-reading balance weight, stroboscope and neon lamp.

DIRECT DRIVE AUTOMATIC TURNTABLE

January 1977

TECHNISCHE DATEN

Typ	Direktantrieb mit 2 Drehzahlen
Plattenteller	Aluminium-Druckgußlegierung, Durchmesser 308mm, Gewicht 1,6kg
Motor	Für den Plattenteller-Antrieb: Gleichstrom-Servomotor Für den automatischen Antrieb: 16-poliger Getriebemotor
Drehzahlen	33-1/3 und 45 U/min
Feinregulierung	± 2,5%
Drehzahl-Umschaltung	Elektronisches Umschalt system
Fremdspannungsabstand	60 dB (bei 50, 60Hz)
Gleichlaufschwankungen	0,025%WRMS
Tonarm	Statisch ausgewuchtet, Rohrtyp
Tonarmkopf	Einsteckbar (gemäß Europa-Standard)
Gesamtlänge	301 mm
Effektive Länge	220 mm
Überhand	15 mm
Tangentialem Spurfehlwinkel ...	2°
Auflagekraft	einstellbar 0-3g, Skala mit 0,2g Teilung
Tonabnehmergewicht	4-10g

Wenn ein Tonabnehmer von HITACHI angebracht ist.

Tonabnehmer	Magnettonabnehmer mit Vertikalbewegung (VFS-261)
Frequenzgang	20-20.000Hz
Ausgangsspannung	3,5 mV bei 1 kHz 50 mm/sec.
Unterschied des Übertragungsmaßes	1 dB bei 1 kHz
Übersprechdämpfung	20 dB bei 1 kHz
Auflagekraft	2 g (empfohlen)
Abtastnadel	Dimantnadel (0,7 mil) (DS-ST26)
Stromversorgung	120V/60Hz (für USA und Kanada), 220V/50Hz (für Europa) 240V/50Hz (für Großbritannien und Australien)
Leistungsaufnahme	5 W (bei 120V) 5 W (bei 220V) 6 W (bei 240V)
Abmessungen, Gewicht	477(B) x 369(T) x 168(H) mm, 9,2 kg (20,2 lbs.)
Sonstiges	Aufsetz-, Tonarm-Rückführ-, Unterbrechungs- und Wiederholungsautomatik, Antiskating-Einrichtung, Auflagekraft-Einstellung mittels Gegengewicht und Direktablesung, Stroboskopscheibe, und Stroboskoplampe.

CARACTERISTIQUES TECHNIQUES

Type	Système d'entraînement direct 2 vitesses
Plateau	Alliage aluminium coulé, 308 mm de diamètre extérieur, poids : 1,6 kg
Moteur	Pour la conduite du plateau: Servo-moteur sans balais à courant continu Pour la marche entièrement automatique: Moteur à engrenages à 16 pôles
Vitesses	33-1/3 et 45 tr/mn.
Gamme de réglage de variation	± 2,5%
Système de changement de vitesses	Changement par commutation électronique
S/B	60 dB (à 50, 60Hz)
Pleurage & scintillement	0,025% Wefficaçe
Bras de lecture	Tubulaire, équilibrage statique
Coquille de phonolecteur	Type enfichabme (modèle standard européen)
Longueur hors-tout	301 mm
Longueur réelle	220 mm
Suspension	15 mm
Erreur de piste	2°
Gamme de réglage de force d'appui (échelle)	0 à 3 gr, 1 tour de bague graduée (lecture directe par cran de 0,2 gr)

Poids de cellule phonolectrice

admissible 4 à 10gr.

Quand vous utilisez une cellule HITACHI.

Cellule phonolectrice	Type à bobine mobile verticale (VFS-261)
Réponse en fréquence	20-20.000Hz
Puissance de sortie	3,5 mV à 1 kHz 50 mm/sec.
Différence de canal	1 dB à 1 kHz
Séparation de canal	20 dB à 1 kHz
Force d'appui	2 gr. (recommandée)
Pointe de lecture	Pointe de lecture de 0,7 mil. de diamant. (DS-ST26)
Alimentation	120V/60Hz pour les normes américaines & canadiennes 220V/50Hz pour les normes européennes. 240V/50Hz pour les normes anglaises et les normes australiennes.
Consommation de puissance ...	5 watts (à 120 V) 5 watts (à 220 V) 6 watts (à 240 V)
Dimensions	477(L) x 369(P) x 168(H)
Poids	9,2 kg (20,2 livres)
Accessoires	Mécanisme de départ automatique et retour automatique, Mécanisme d'arrêt automatique et répétition automatique, antiskating, force d'appui à lecture directe avec contrepoids d'équilibrage, stroboscope et lampe au néon.

FEATURES

1. Uni-torque motor
2. Easy-to-use full automatic mechanism
3. Performance improved with 2-motor system
4. Speed adjustment by means of the neon lamp and stroboscope
5. Employment of the low center of gravity tone arm
6. Oil damped arm lifter never damages stylus tip
7. Structure resistant to howling
8. Easily removable dust cover

TECHNISCHE MERKMALE

1. Direktantrieb mit neuartigem Motor
2. Automatischer Tonarm
3. Verbesserte Leistung durch zwei Motoren
4. Drehzahlfeinregulierung mittels Stroboskop
5. Tonarm mit tiefliegendem Gewichtsschwerpunkt
6. Ölgedämpfter Tonarmlift
7. Trittschallgedämpfte Ausführung
8. Abnehmbarer Staubschutzdeckel

CARACTÉRISTIQUES

1. Moteur à couple unique
2. Mécanisme entièrement automatique d'emploi aisé
3. De meilleures performances avec le système à 2 moteurs
4. Le réglage de la vitesse est réalisé par l'intermédiaire d'une lampe au neon et d'un stroboscope
5. Adoption d'un bras de lecture à centre de gravité abaissé
6. Lève-bras à ralentisseur hydraulique source de protection de pointe de lecture
7. Structure de la platine efficace au ronflement
8. Capot anti-poussière aisément amovible

NAMES OF COMPONENTS · BEZEICHNUNG DER TEILE · NOMS DES COMPOSANTS

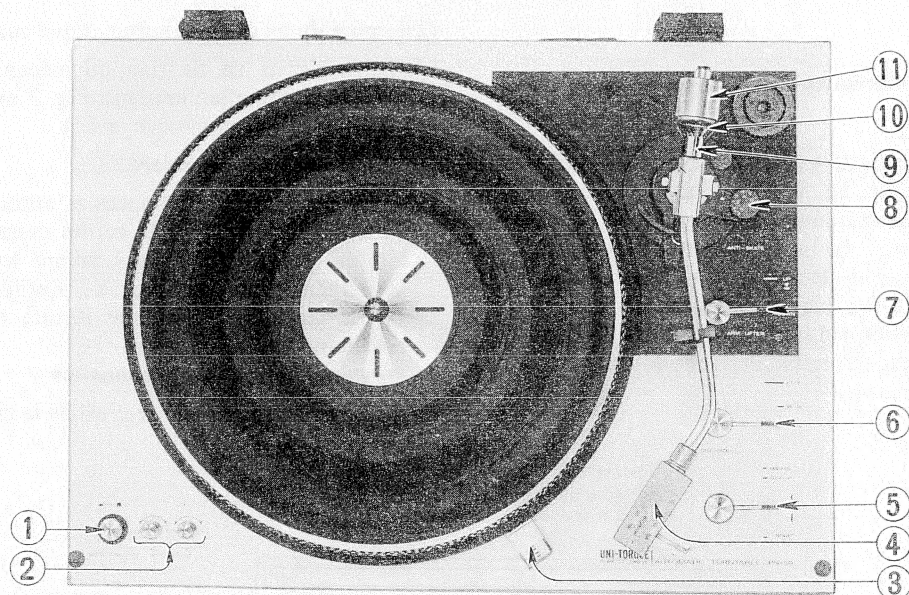


Fig. 1
Abb. 1

- | | | |
|----------------------------|------------------------------|---|
| ① Speed Change-over button | ① Drehzahlwähler | ① Bouton de changement de vitesses |
| ② Pitch Control Knob | ② Drehzahl-Feinregulierung | ② Bouton de réglage de variation de vitesse |
| ③ Neon Lamp Case | ③ Stroboskop-Einstellung | ③ Défilement des rainures du Stroboscope |
| ④ Head Shell | ④ Einsetzen Des Tonabnehmers | ④ Cellule phonoelectrice |
| ⑤ Operation Lever | ⑤ Steuerhebel | ⑤ Levier d'opération |
| ⑥ Record Size Selector | ⑥ Plattengrößenwähler | ⑥ Sélecteur de dimension de disque |
| ⑦ Arm Lifter Lever | ⑦ Tonarmlift | ⑦ Lève-bras et levier |
| ⑧ Anti-skating Knob | ⑧ Antiskating-Einstellung | ⑧ Réglage de l'anti-skating |
| ⑨ Indication Line | ⑨ Bezugsmarke | ⑨ Ligne d'indication |
| ⑩ Scale Ring | ⑩ Skalenring | ⑩ Bague graduée |
| ⑪ Balance Weight | ⑪ Gegengewicht | ⑪ Contrepoids d'équilibrage |

SERVICE POINT

1. Removing the mechanical assembly

(1) Removing the sub-bed

Remove the platter after fixing the tone arm to the arm rest. Then, remove the bottom plate, release the vinyl-tie which fixes the lead wire as shown in Fig. 2, remove the selector lever fixing screw, then remove the selector bar. Next, remove the sub-bed fixing screw after removing the platter frill fixing screw as shown in Fig. 3, and when this is done it should look like Fig. 4.

(2) Removing the complete auto-mechanism assembly

Remove the complete auto-mechanism assembly fixing

screw shown in Fig. 2 after removing the sub-bed by the procedure described in (1).

(3) Removing the tone arm

After removing the complete auto-mechanism assembly by the procedure described in (2), remove the 2 hexagonal socket-head fixing screws shown in Fig. 5 to remove the backing plate. Then, remove the 2 tone arm fixing screws which are installed inside it.

2. Cartridge attaching

Perform installation or replacement of the cartridge as follows.

WARTUNGSPUNKTE

1. Ausbau der mechanischen Einheit

(1) Ausbau der Zwischenkonsole

Tonarm an der Tonarmstütze anbrinagen und den Platten teller abnehmen. Danach die Bodenplatte abnehmen, die Befestigung des Kabels gemäß Abb. 2 lösen, die Befestigungsschraube des Wahlhebels ausdrehen und die Wahlstange abnehmen. Danach die Befestigungsschraube der Zwischenkonsole lösen, die Befestigungsschraube des Plattenspielerziergitters gemäß Abb. 3 abnehmen, wonach sich der in Abb. 4 gezeigte Zustand ergibt.

(2) Ausbau der Automateinheit

Die Zwischenkonsole gemäß Beschreibung in Punkt (1) abnehmen und danach die Befestigungsschraube der Automateinheit lösen, wie es in Abb. 2 gezeigt ist.

(3) Ausbau des Tonarmes

Nachdem die Automateinheit gemäß Beschreibung in Punkt (2) entfernt wurde, die beiden Innensechskantschrauben gemäß Abb. 5 ausdrehen und die Nachlaufscheibe abnehmen. Danach die beiden Befestigungsschrauben des Tonarmes an der Innenseite lösen.

ENTRETIEN

1. Dépose des ensembles mécaniques

(1) Dépose du sous-châssis

Retirer le plateau tourne-disques après avoir fixé le bras de lecture sur le repose-bras. Retirer la plaque inférieure et libérer la fixation plastique qui retient le fil de jonction comme le montre la Fig. 2, retirer la vis de fixation du levier sélecteur et retirer la tige de sélection. Retirer ensuite la vis de fixation de sous-châssis après avoir retiré la vis de fixation comme le montre la Fig. 3, quand cette opération est terminée, l'ensemble doit se présenter comme sur la Fig. 4.

(2) Dépose du mécanisme automatique complet

Retirer la vis de fixation du mécanisme automatique complet comme le montre la Fig. 2 après avoir retiré le sous-châssis comme décrit en (1).

(3) Dépose du bras de lecture

Après dépose du mécanisme automatique complet comme décrit en (2), retirer les deux vis de fixation à tête cylindrique à six pans comme le montre la Fig. 5 pour déposer la plaque arrière. Retirer ensuite les deux vis de fixation du bras de lecture qui se trouvent à l'intérieur.

2. Fixation de cellule phonoelectrice

Installez ou remplacez la cellule de la manière suivante.

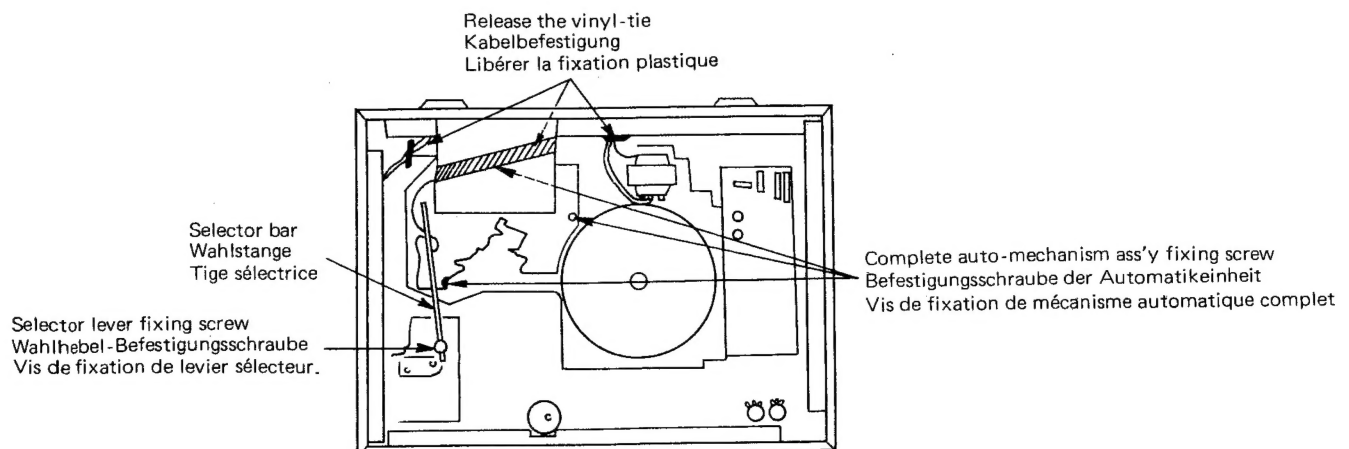


Fig. 2 Abb. 2

- (1) Attach the cartridge to the head shell with cartridge fixing screws.
- (2) The polarities and L,R channel of the lead wire of the head shell are shown in Fig. 6. The connection should be done according to the terminal indication of the cartridge.

3. Stroboscope

The servo amplifier is unstable for approx. 30 sec. after power is switched on, so adjust speed 30 secs. after the platter starts to rotate. Generally, the frequency of household a.c. is very stable, but this is only over the long run and in the short term there may be variations of about 0.2%. Because of this, the stripes of the stroboscope may appear to move in one direction or the other depending on the frequency of the power source which lights the neon lamp, even if the speed of the platter is correct. In this case, it is not necessary to adjust the speed. Another point which you should note is that, if the speed is adjusted with the stylus not in contact with the record, when you play a record, the stripes of the stroboscope may appear to move slightly. The variation in speed due to this is as little as 0.1% and this will not affect the sound of the music.

2. Einsetzen des Tonabnehmers

Führen Sie Installation und Auswechselung des Tonabnehmers wie folgt durch.

- (1) Tonabnehmer in den Tonarmkopf einsetzen und mit den Befestigungsschrauben sichern.
- (2) Die Polarität sowie der Anschluß der Tonleiter des Tonabnehmers für den linken und rechten Kanal sind in Abb. 6 dargestellt. Der Anschluß ist gemäß der Tonabnehmer-Klemmenbezeichnung auszuführen.

3. Stroboskop

Nach dem Einschalten der Stromzufuhr arbeitet der Servoverstärker für ca. 30 Sekunden unregelmäßig;

- (1) Fixer la cellule phonolectrice sur la coquille à l'aide des vis de fixation de cellule.
- (2) Les polarités et les canaux L et R de la coquille de phonolecteur sont indiqués sur la Fig. 6. Les connexions doivent être faites en fonction de l'indication de borne de la cellule phonolectrice.

3. Le stroboscope

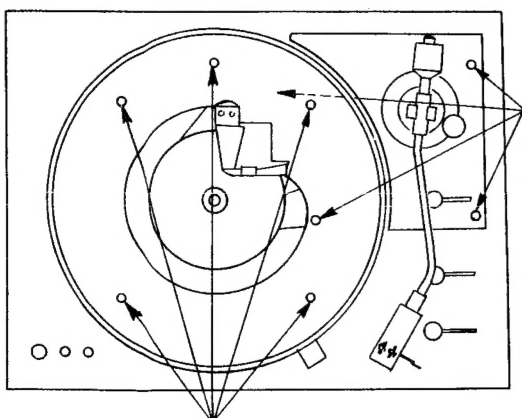
Le servo amplificateur est instable pendant environ 30 secondes après la mise en marche, il est donc conseillé de n'effectuer l'ajustement de la vitesse que 30 secondes après la mise en rotation du plateau. Généralement la fréquence d'alimentation domestique est très stable, ceci

4. Click phenomenon

The uni-torque motor of this unit itself has a constant output and rotates smoothly. And the control circuit is

daher sollte die Drehzahl des Plattentellers erst ca. 30 Sekunden nach dem Einschalten der Stromzufuhr eingestellt werden. Normalerweise ist die Frequenz des Haushaltsnetzes sehr stabil, gelegentlich können jedoch Schwankungen von ca. 0,2% auftreten. Daher kann es den Anschein haben, als ob die Stroboskopscheibe in die eine oder andere Richtung dreht, abhängig von der Frequenz der Stromquelle, mit welcher die Neonlampe betrieben wird, auch wenn die Plattenspielerdrehzahl richtig eingestellt ist. In einem solchen Fall muß die Plattentellerdrehzahl nicht nachjustiert werden. Ein anderer Punkt, der zu beachten ist: wird die Drehzahl eingestellt, ohne die Abtastnadel auf die Schallplatte aufzusetzen, so kann beim Abspielen einer Schallplatte eine Bewegung

n'est cependant vrai que pour une intervalle de temps suffisant, les variations sur une courte période peuvent atteindre 0,2%. Pour cette raison les bandes du stroboscope peuvent se déplacer dans une direction ou dans l'autre selon les variations de la fréquence d'alimentation de la lampe au néon, même si la vitesse du plateau est correcte. Dans ce cas il n'est pas nécessaire d'ajuster la vitesse. Signalons un autre point important: si la vitesse est ajustée quand la pointe de lecture n'est pas en contact avec le disque, lors de l'écoute, les bandes du stroboscope peuvent se déplacer légèrement. Cette légère variation de vitesse de l'ordre de 0.1% n'affecte pas l'écoute musicale.



Platter friction fixing screw
Plattenspielerzierring-Befestigungsschraube
Vis de fixation frisée du plateau

Sub-bed fixing screw
Zwischenkonsolen-
Befestigungsschraube
Vis de fixation de sous-châssis

Fig. 3
Abb. 3

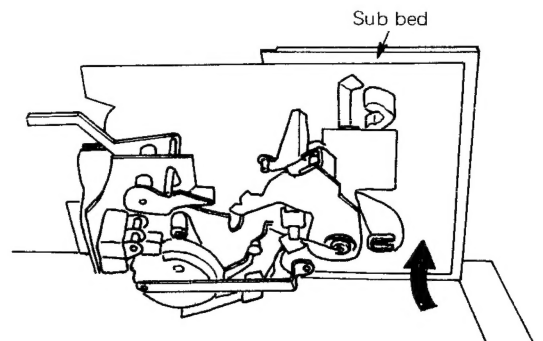


Fig. 4 Abb. 4

so designed that the best performance is obtained when the platter is placed on. Accordingly, when the motor is rotated with the platter detached, a clicking sound (uneven rotation) occurs because of the operation of the servo circuit.

This is not a malfunction, and it does not occur when the platter is placed on.

5. Bearing section of the motor

Since the bearing section of the motor is finished precisely, it is feared that it may be damaged or dust may enter when it is detached. Accordingly, it is

der Stroboskopstreifen festgestellt werden. Diese Drehzahlsschwankung beträgt aber nur 0,1% und hat keinen Einfluß auf die Wiedergabequalität.

4. Gleichlaufstörungen

Der Antriebsmotor dieses Plattenspieler zeichnet sich durch konstantes Drehmoment aus und bürgt für ausgezeichnete Laufruhe und Laufpräzision. Die Regelschaltung diese Gleichstrommotors wurde jedoch so ausgelegt, daß optimale Ergebnisse nur dann erzielt werden, wenn der Plattenteller auf die Motorwelle aufgesetzt ist. Wenn daher der Motor bei ausgebaute Plattenteller eingeschaltet wird, kann es zu Gleichlaufstörungen kommen, die jedoch ohne Bedeutung sind, da ja Schallplatten nur bei angebrachtem Plattenteller abgespielt werden.

5. Lagerung des Motors

Die Lagerung des Motors sollte niemals ausgebaut

requested not to replace the bearings.

6. Troubleshooting of the Hall element

When the motor does not rotate or when the motor rotates but wow & flutter is excessive and the torque of the motor is low, check the Hall element in the following way. Connect the tester between terminals No. ③ - ⑪, ④ - ⑤, and ⑧ - ⑨, and check whether the DC resistance between the respective terminals is 175 ± 35 ohms. When they are different, replace the motor. Be careful with the Hall element as it is liable to be damaged when the high voltage is applied.

werden, wenn es nicht unbedingt erforderlich ist, um Eindringen von Staub in die Präzisionslagerung zu vermeiden.

6. Fehlersuchanleitung für das Hall-Element

Wenn der Motor nicht oder nur mit relativ hohen Gleichlaufschwankungen dreht, oder wenn das Drehmoment des Motors zu gering ist, die Hall-Elemente wie folgt prüfen.

Ein Prüfgerät zwischen die Klemmen Nr. ③ - ⑪, ④ - ⑤ und ⑧ - ⑨ schalten und kontrollieren, ob der Widerstand bei Gleichspannung zwischen diesen Klemmen 175 ± 35 Ohm beträgt. Ist dies nicht der Fall, dann muß der Motor erneuert werden. Unbedingt darauf achten, daß die Hall-Elemente durch zu hohe Spannungen beschädigt werden könnten.

4. Phénomène de cliquetis

Le moteur à couple unique de cet appareil est constant par lui-même et sa puissance de sortie et sa rotation sont régulières tandis que le circuit de commande est conçu de telle sorte qu'un rendement idéal est obtenu quand le plateau de lecture est engagé sur l'axe d'entraînement. Par conséquent, quand le moteur tourne sans plateau, un phénomène de cliquetis se manifeste (phénomène de rotation irrégulière), étant donné la mise en fonction du circuit d'asservissement. Ceci ne peut être considéré comme une panne et ce ne se produit pas quand le plateau de lecture est engagé sur son axe.

5. Roulement du moteur

Etant donné que le roulement de moteur est de haute précision de finition, il risque d'être endommagé ou

encrassé quand il est démonté. Par conséquent, il n'est pas recommandé de démonté le roulement moteur.

6. Panne du générateur à effet de Hall

Quand le moteur ne tourne pas ou quand le moteur tourne et que le taux de pleurage et de scintillement est très important et que le couple moteur est faible, vérifier le fonctionnement du générateur à effet de Hall de la façon suivante. Connecter un contrôleur entre les bornes No ③ et ⑪, ④ et ⑤, et ⑧ et ⑨ et s'assurer résistance à courant continu entre chaque borne est de 175 ± 35 ohms.

Si les résultats sont différents, remplacer le moteur. Prendre toutes les précautions nécessaires car le générateur à effet de Hall risque d'être endommagé par la haute tension.

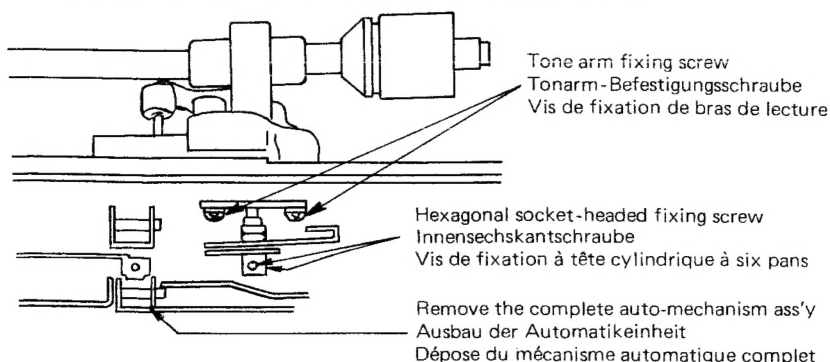


Fig. 5 Abb. 5

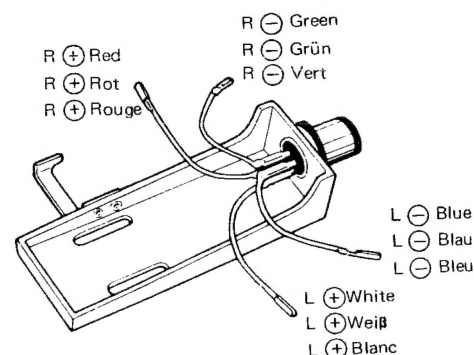


Fig. 6 Abb. 6

ADJUSTMENT

1. Overhang adjustment

Adjust the overhang when the cartridge is attached. In case of PS-58, overhang of the tone arm is 15mm. Adjust it by moving the cartridge back and forth after loosening the cartridge fixing screw.

Tighten the cartridge fixing screw after adjustment is completed. (Fig. 7)

2. Tracking force adjustment

The tracking force adjustment should be done before playing. The tracking force must be adjusted to the recommended value as shown on the instruction sheet of the cartridge.

(1) Rotate the balance weight ① until the tone arm is

balanced evenly.

(2) When the tone arm is balanced evenly turn the scale ring ② alone until the "0" on the scale ring of the balance weight is set over the indication line. The tone arm is now set at zero gram.

(3) Turn the balance weight ① slowly until the indication line comes to the specified force. The stylus tip will then be adjusted to the desired tracking force. (Fig. 8)

3. Anti-skating adjustment

Match the anti-skating dial to the indicated line in accordance with the tracking force of the cartridge used. (Fig. 8)

EINSTELLVERFAHREN

1. Überhang-Einstellung

Der Überhang des Tonarmes ist nach dem Anbringen des Tonabnehmers einzustellen. Bei Modell PS-58 ist der Tonarm-Überhang auf 15mm einzustellen; dazu die Befestigungsschrauben des Tonabnehmers lösen und Tonabnehmerschlitten verstellen, bis der gewünschte Wert erreicht ist. Anschließend die Befestigungsschrauben wieder festziehen. (Abb. 7)

2. Einstellung der Auflagekraft

Die Auflagekraft muß vor Inbetriebnahme gemäß der dem Tonabnehmer beigelegten Anleitung vorgenommen werden; die angegebene Auflagekraft der Abtastnadel ist genau einzuhalten.

(1) Das Gegengewicht ① drehen, bis der Tonarm ausbalanciert ist.

(2) Nach dem Ausbalancieren des Tonarmes ist der Skalenring ② zu drehen, bis die Markierung "0" des Skalenringes mit der Bezugsmarke übereinstimmt. Die Auflagekraft ist damit auf Null (0) Gramm eingestellt.

(3) Anschließend das Gegengewicht ① drehen, bis die vorgeschriebene Auflagekraft mit der Bezugsmarke in Deckung kommt. Damit ist die gewünschte Auflagekraft der Abtastnadel eingestellt. (Abb. 8)

3. Antiskating-Einstellung

Die Skala der Antiskating-Vorrichtung ist auf den Wert der Auflagekraft der Abtastnadel einzustellen. (Abb. 8)

METHODE D'AJUSTAGE

1. Réglage d'équilibre

Régler l'équilibre de la cellule une fois fixée.

Dans le cas de la PS-58, l'équilibre du bras de lecture est de 15mm. Le régler en déplaçant la cellule phonoelectrice d'avant en arrière après avoir libéré les vis de fixation de la cellule.

Lorsque le réglage est terminé, resserrer les vis de fixation. (Fig. 7)

2. Réglage de force d'appui

Le réglage de force d'appui doit être fait avant de lire un disque. La force d'appui doit être réglée selon la valeur préconisée indiquée sur le feuillet explicatif la accompagne le cellule.

(1) Tourner le contrepoids équilibrage ① jusqu'à ce que le

bras de lecture soit parfaitement équilibré.

(2) Une fois le bras de lecture équilibré, tourner la bague noire graduée ② jusqu'à ce que le "0" vienne en regard de la ligne de repérage. Le bras de lecture est alors réglé sur zéro gramme de force d'appui.

(3) Tourner le contrepoids équilibrage ① assez lentement jusqu'à ce que la ligne de repérage vienne se mettre en regard de la force d'appui préconisée. La pointe de lecture peut être réglée pour une force d'appui optimum. (Fig. 8)

3. Réglage de l'anti-skating

Ajuster l'échelle de l'anti-skating avec la ligne de

4. Speed adjustment

When the pattern of the stroboscope appears to be moving and the rated speed cannot be obtained by turning the speed control knob, remove the bottom plate and adjust the speed control semi-fixed resistor (VR01, 02) shown in Fig. 9 as follows.

- (1) Align the speed changeover lever to the speed which it is desired to adjust.
- (2) Set the speed control knob of the desired speed at the center.
- (3) Gradually turn VR01 for 33 rotation and VR02 for 45 rotation using a (—) screwdriver so that the patterns of the stroboscope appears to stop.
Approx. $\pm 6\%$ adjustment is possible using this semi-fixed resistor.

5. Adjustment of the stylus lowering point

Adjust it in the following manner, and use a market-

sold 30cm record when adjusting.

- (1) Remove the rubber cap.
- (2) Perform auto-in operation to check the lowering point of the stylus.
- (3) Adjust the stylus lowering adjusting screw with a screwdriver. When the stylus lowering point has deviated to inside the record, turn the adjusting screw leftward \curvearrowleft , and when the point is outside the record, turn the adjusting screw rightward \curvearrowright . The lowering point of the stylus changes by approximately 1.5mm by rotating the adjusting screw a half turn.
- (4) Repeat (2) and (3) to have the stylus lower to the position shown in Fig. 10.

6. Adjustment of auto-return

The auto-return position is automatically adjusted when the auto-in position is adjusted and no further adjustment

4. Drehzahl-Feinregulierung

Wenn die Stroboskopmarkierungen den Anschein erwecken, sich in einer Richtung zu drehen, und die Drehzahl mittels Feinregulierung nicht auf den Nennwert eingeregelt werden kann, dann muß die Bodenplatte abgenommen werden, worauf die Verstellwiderstände (VR01, 02) in Abb. 9 wie folgt einzustellen sind.

- (1) Drehzahlwähler auf die gewünschte Drehzahl einstellen.
- (2) Die Feinregulierung für die entsprechende Drehzahl in Mittelstellung bringen.
- (3) Danach die Widerstände VR01 (für 33-1/3 U/min) bzw. VR02 (45 U/min) langsam mittels Schraubenzieher verstellen, bis die Stroboskopmarkierungen still zu stehen scheinen.
Mit diesen Widerständen ist eine Feinregulierung von $\pm 6\%$ möglich.

5. Einstellung des Abtastnadel-Aufsetzpunktes

Für diese Einstellung eine 30cm-Langspielplatte verwenden und die Einstellung wie folgt durchführen.

- (1) Gummikappe abnehmen.
- (2) Automatischen Tonarm einschalten, um den Aufsetzpunkt zu kontrollieren.
- (3) Danach die Einstellschraube für den Abtastnadel-Aufsetzpunkt mit einem Schraubenzieher einjustieren. Wenn der Aufsetzpunkt zu weit innen liegt, die Schraube nach links drehen; die Schraube nach rechts drehen, wenn der Aufsetzpunkt zu weit außen liegt. Durch Drehen um eine halbe Umdrehung der Einstellschraube wird der Aufsetzpunkt um ca. 1,5mm geändert.
- (4) Die Schritte (2) und (3) wiederholen, bis der Aufsetzpunkt gemäß Abb. 10 eingestellt ist.

repérage en fonction de la force d'appui de la pointe de lecture de la cellule phonoelectrice utilisée. (Fig. 8)

4. Réglage de la vitesse

Quand la courbe du stroboscope bouge et que la vitesse nominale n'est pas obtenue en tournant le bouton de réglage de vitesse, retirer le plateau inférieur et ajuster la résistance semi-fixe de réglage de vitesse (VR01, 02) comme indiqué sur la Fig. 9.

- (1) Régler le levier de commutation de vitesse sur la vitesse désirée pour obtenir la vitesse nominale.
- (2) Régler le bouton de réglage de vitesse de la vitesse désirée sur la position centrale.
- (3) Tourner VR01 quand il s'agit de 33 tr/mn. et VR02 pour 45 tr/mn, agir progressivement en utilisant un tournevis (—) de telle sorte que la courbe rapportée par le stroboscope soit fixe. Un réglage supérieur à $\pm 6\%$ peut être obtenu en réglant cette résistance semi-fixe.

5. Ajustement du point d'abaissement de la pointe de lecture

Pour l'ajustement, opérer de la manière suivante en utilisant un disque 30cm vendu dans le commerce.

- (1) Enlever le couvercle en caoutchouc.
- (2) Mettre la marche automatique pour vérifier le point d'abaissement de la pointe de lecture.
- (3) Ajuster la vis de réglage de l'abaissement de pointe de lecture à l'aide d'un tournevis. Quand le point d'abaissement est dévié à l'intérieur du disque, tourner la vis d'ajustage vers la gauche \curvearrowleft et quand le point d'abaissement se situe à l'extérieur du disque tourner la vis d'ajustement vers la droite \curvearrowright . Le point d'abaissement se déplace de 1,5mm approximativement pour un demi-tour de la vis d'ajustement.
- (4) Recommencer 2 et 3 pour avoir le bas de la pointe de lecture dans la position de la Fig. 10.

is required. When it is necessary to adjust it, check the position of the guide cam with the stopper so that the dimensions become as shown in Fig. 11. When the auto-return does not work when this is done, adjust by bending the tip of the follow-up plate shown in Fig. 12 slightly with pliers, etc. When the adjustment record is used and the tip is bent by approximately 0.5mm, the number up to which counting is done changes by one.

7. Adjustment of friction force

It is necessary to apply a constant force to the tone arm for normal operation. Adjust by turning the screws shown in Fig. 12 so that when the tone arm is moved horizontally while a record is being played, the moving force is $6g \pm 1g$.

8. Adjustment of push rod cap

The difference between the height of the stylus tip lifted by the mechanism and the height of the stylus tip

tip lifted by the arm lifter can be corrected by adjusting the position of the push rod cap. (Fig. 13)

9. Adjustment of the torque difference of the motor drive coil

When the motor or the control printed wiring board is replaced, adjust the difference between the two phases of the motor drive-coil using VR03 shown in Fig. 9.

Since the motor drive waveform of the leading phase appears at terminal No. 6, and the lagging phase at terminal No. 7, connect a synchroscope and adjust the size of the waveform of the lagging phase using VR03 so that respective waveform are of equal size.

6. Einstellung der Tonarm-Rückführautomatik

Wenn der Aufsetzpunkt richtig eingestellt ist, ist auch die Tonarm-Rückführautomatik richtig eingestellt. Gegebenenfalls jedoch die Position der Führungsnocke und des Anschlages einstellen, so daß sich die in Abb. 11 gezeigten Abmessungen ergeben. Wenn die Rückführautomatik trotzdem nicht richtig arbeitet, die Spitze der Nachlaufscheibe gemäß Abb. 12 etwas abbiegen. Wenn die Einstellplatte verwendet und die Spitze um ca. 0,5mm abgelenkt wird, ändert die Zählnummer um eine Stelle.

7. Einstellen der Reibungskraft

Für normalen Betrieb muß am Tonarm eine konstante Kraft angreifen. Die in Abb. 12 gezeigte Schraube drehen, bis die Kraft zur horizontalen Bewegung des Tonarmes beim Abspielen einer Schallplatte auf $6g \pm 1g$ eingestellt ist.

8. Einstellung der Schubstangenhaube

Die Differenz zwischen der mittels Mechanismus abgehobenen Nadelspitzenhöhe und der Höhe der Nadelspitze bei Verwendung des Tonarmliftes kann durch Einstellen der Schubstangenhaube berichtigt werden. (Abb. 13)

9. Einstellen der Drehomentendifferenz der Antriebsspulen des Motors

Wenn der Motor oder die Grundplatte des Bedienungs-feldes ausgebaut wurden, dann muß die Phasendifferenz zwischen der beiden Antriebsspulen mittels VR03 gemäß Abb. 9 eingestellt werden. Da die voreilende Phase an Klemme Nr. 6 und die nacheilende Phase an Klemme Nr. 7 abgenommen werden kann, ein Synchroskop anschließen und die nacheilende Phase mittels VR03 einstellen, so daß die beiden Wellenformen übereinstimmen.

6. Ajustement du retour automatique

Le retour se trouve automatiquement ajusté lors du réglage de la mise en marche automatique, aucun autre ajustement n'est alors nécessaire.

Quand un ajustage est nécessaire, vérifier la position de la came de guidage avec la butée afin que les dimensions correspondent à celles de la Fig. 11.

Quand le mécanisme de retour automatique ne marche pas après les opérations précédentes, ajuster l'extrémité de la plaque de contact en pliant l'extrémité à l'aide de pinces comme il est montré sur la Fig. 12.

Quand on utilise l'ajustement pour disques et que l'extrémité est pliée d'environ 0,5mm, le nombre utilisé pour le comptage change d'une unité.

7. Ajustement de la force de friction

Il est nécessaire d'appliquer au bras une force constante pour une utilisation normale. Ajuster en tournant les vis montrées sur la Fig. 12 de telle façon que lorsque le bras se déplace horizontalement en cours de lecture d'un disque, la force de déplacement soit de $6gr \pm 1gr$.

8. Ajustement de la tête de la tige poussoir

La différence entre la hauteur de l'extrémité de la pointe de lecture quand le bras est levé par le mécanisme et quand le bras est levé par le levier à main peut être corrigée en ajustant la position de la tête de la tige poussoir. (Fig. 13)

9. Réglage de différence de couple de bobine de commande du moteur

Quand le moteur ou la plaque du panneau de commande est remplacée, régler la différence entre les deux phases de la bobine de commande du moteur à l'aide de VR03 comme le montre la Fig. 9. Etant donné que la forme d'onde du moteur d'entraînement de la phase d'avance apparaît à la borne No 6, et que le retard de phase apparaît à la borne No 7, connecter un synchroscope et ajuster la dimension de la forme d'onde de la phase de retard à l'aide de VR03 de telle sorte que les formes d'ondes soient identiques.

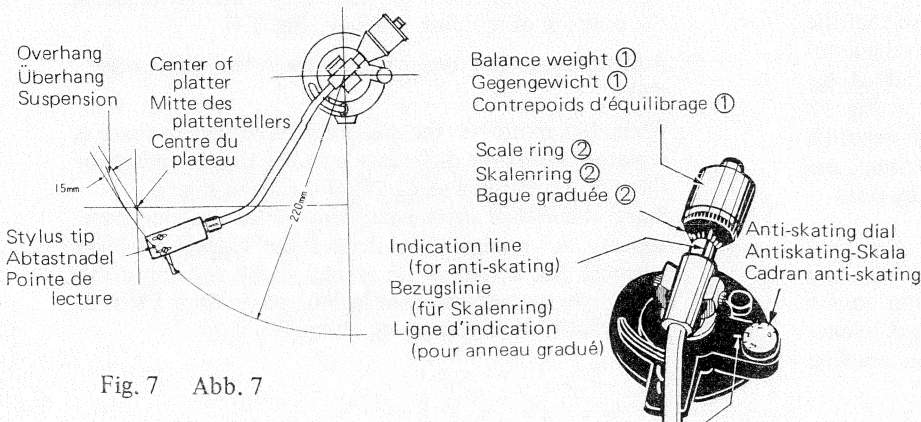


Fig. 7 Abb. 7

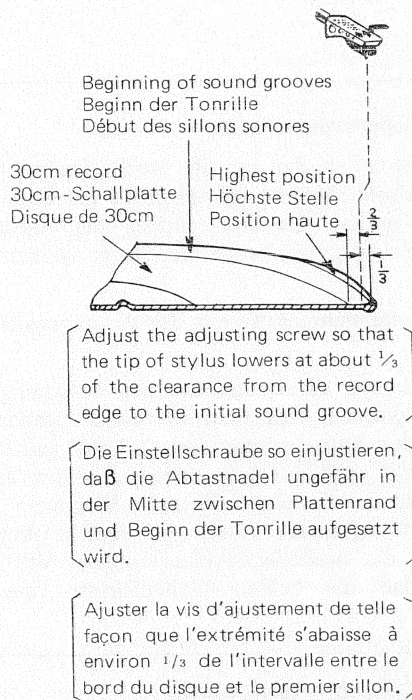


Fig. 10 Abb. 10

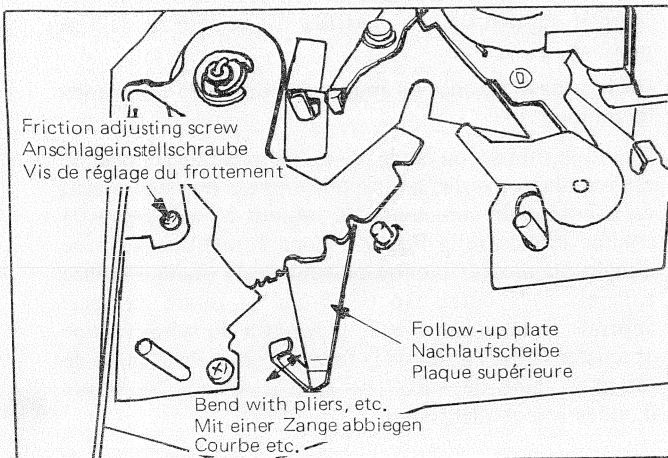


Fig. 12 Abb. 12

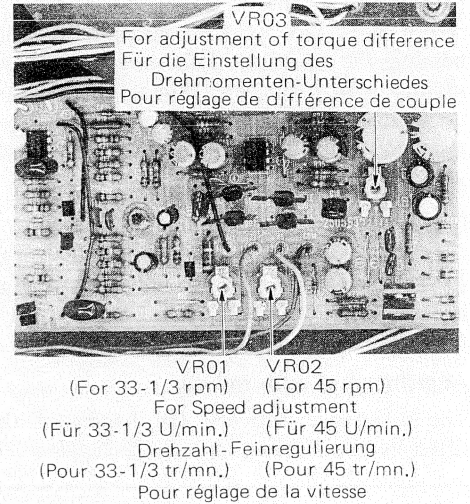


Fig. 9 Abb. 9

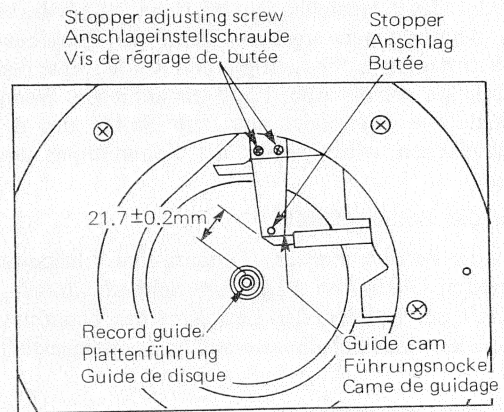


Fig. 11 Abb. 11

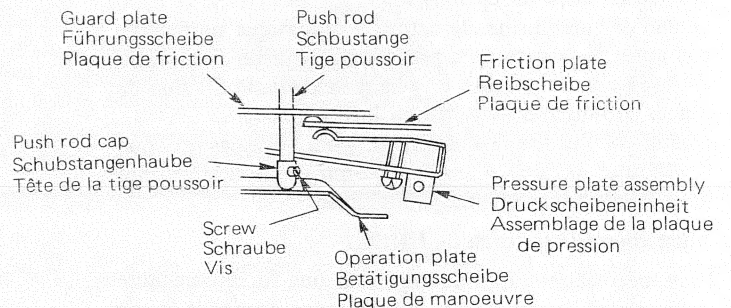


Fig. 13 Abb. 13

EXPLANATION OF THE NEW SYSTEM

■ Uni-torque motor

The uni-torque motor consists of 2 doughnut type rotor magnet with 8 magnetized poles, star type drive-coil, speed detection base board, Hall element and control circuit (base board). (Fig. 14)

This motor is a capable new type motor with a simple structure that enables stable rotation.

The structural and operational principles are explained below.

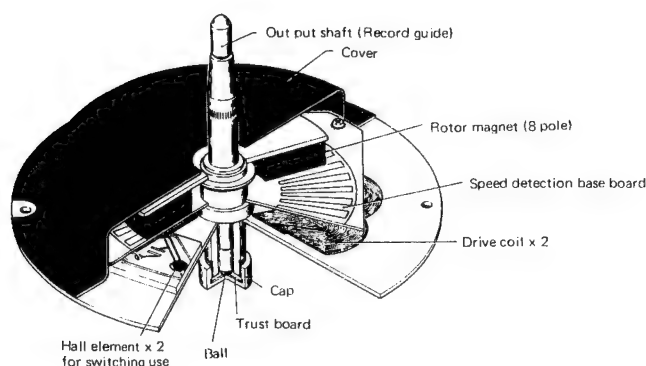


Fig. 14 Internal structure

1. Generation of turning force

The basic structure is shown in Fig. 15. A square type (actually it is star type to raise efficiency) drive-coil and rotor magnet are arranged opposing the shaft direction. When current flows in the direction of the arrow, the force (f) is generated in the drive-coil according to Fleming's Left Hand Rule. This force becomes the resolved force of f_t against the tangential direction. Since the drive-coil is fixed, repulsion force generates in the rotor magnet, and the rotor magnet rotates in the direction of the arrow. When the direction of the current of the drive-coil is changed during rotation, the generated torque continuously repeats the max. value and min. value.

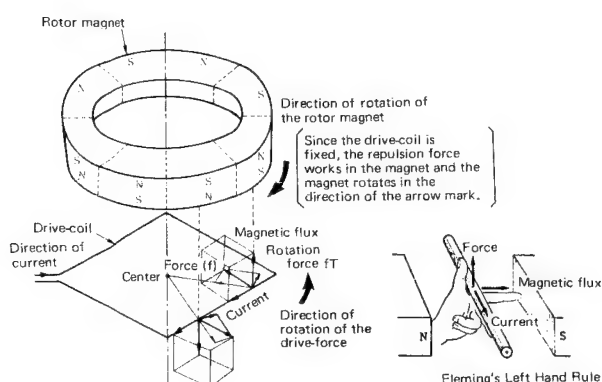


Fig. 15 Basic structure

By installing another drive-coil 22.5° from the above drive-coil, the torque is compensated alternately, and an approximately constant torque can be obtained in all the angles of the rotary magnet. (Fig. 16)

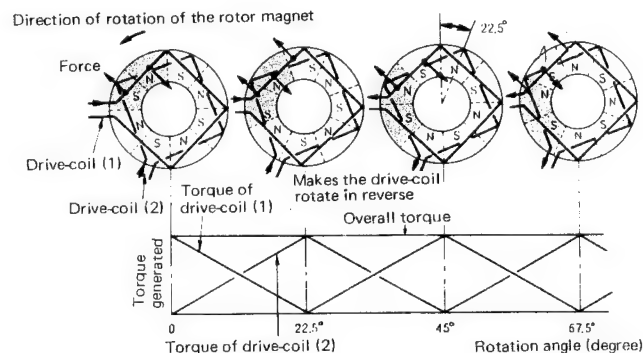


Fig. 16 Principle of generation of uni-torque

2. Speed Control

The uni-torque motor features the changing of torque and speed by voltage, same as in a normal DC motor. (Fig. 17)

The speed is kept constant by adjusting the voltage applied to the drive-coil, using the above characteristics.

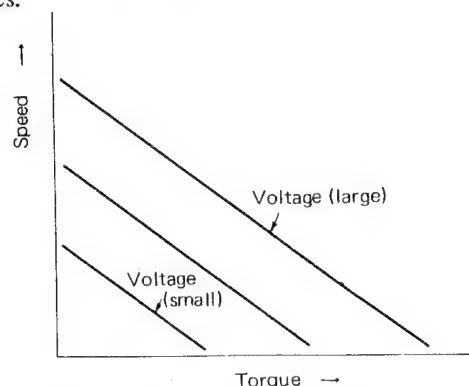


Fig. 17 Characteristics of DC motor

(a) Speed detection

The signal with a frequency proportional to the rotation speed of the rotor magnet is detected by arranging the speed detection base board opposing to the rotor magnet and making the pattern of the base board cross the magnetic flux. (Fig. 18)

Since this system is simple and highly reliable and, in addition, detection is done at 8 points equally spaced on the circumference of the base board, high precision signals can be obtained.

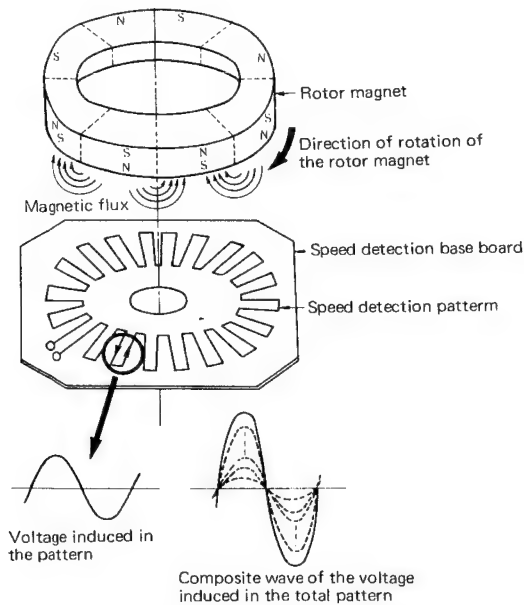


Fig. 18 Speed detection method

(b) Limiter amplifier, shaping of the waveform

After amplifying the detected signal in an excess saturation, shape the waveform to a rectangular form, to remove the influence of the uneven size of the detected signal.

(c) Differentiation shaping, multiplication, mono-multivibrator

Differentiate the rectangular wave, multiply (2 times) the differentiated pulse to hasten the response frequency of the servo system, and add that signal to the gate of the mono-multivibrator. The output of the mono-multivibrator turns in reverse when the differentiation pulse

enters into it, and returns after a certain time ellapses. This time is determined by the circuit constant. Here, the change of the frequency is converted to the change of DC.

(d) Low-pass filter

DC output is obtained by integrating the rectangular wave, which is made through mono-multiplication. This DC output gets larger when the rotation of the motor is quickened, and gets smaller when the rotation becomes slow.

(e) Reference voltage, voltage comparison

Assuming the voltage with the specified rotation ($33\frac{1}{3}$, 45 rpm) as standard, compare the DC voltage from the low pass filter and take out the difference of the voltage.

(f) Switching by Hall element

The Hall element can take out the voltage of the sinusoidal wave in accordance to the change of the supplied current and magnetism (density and direction of the magnetic flux). With the motor of this unit, it is necessary to change the direction of the current which flows through the drive-coil, depending on the relative position of the drive-coil and rotor magnet, so arrange the 2 Hall elements opposing the rotor magnet, and convert the DC voltage which is taken out as difference after voltage comparison in (e), and make it a standard sinusoidal wave for rotation of the motor. Amplify this to add to the drive-coil and control the motor rotation. A protective circuit is built into this section to prevent over-current from flowing when the turntable is depressed.

(g) Drive-coil

The sinusoidal wave current, which is controlled by the rotation speed, is applied to the drive-coil, and the torque, with which stable rotation can be obtained, is generated.

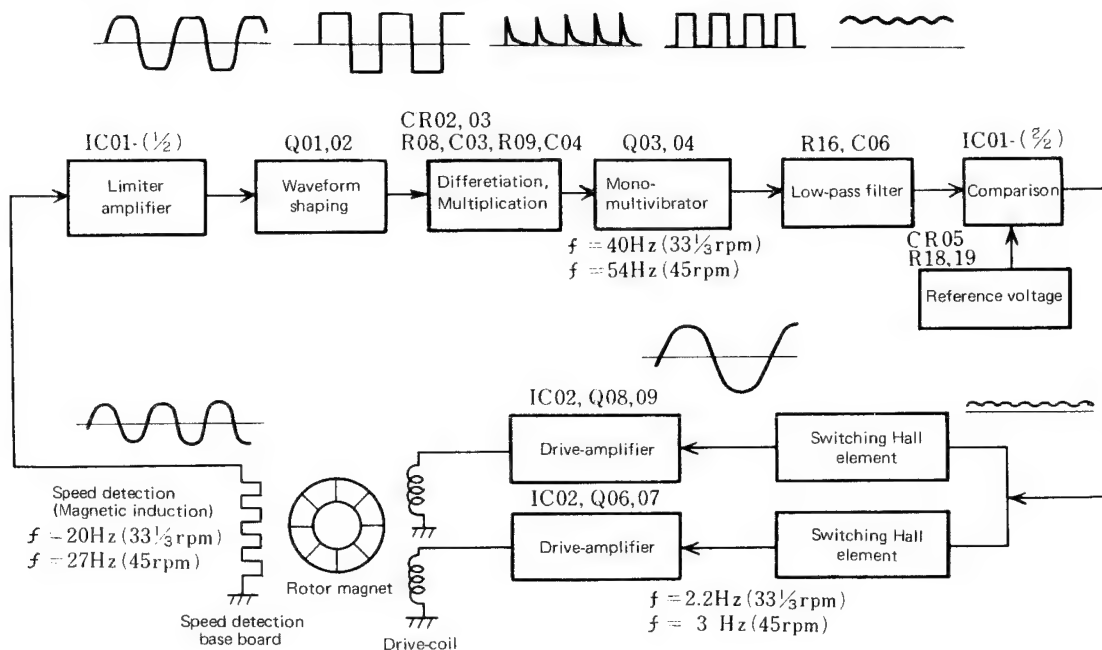


Fig. 19 Block diagram of the servo circuit

EXPLANATION OF AUTOMATIC MECHANISM OPERATION

1.1 Setting of record size

- (1) Set the record size selector to the specified size.
(30, 25, 17)
- (2) The selector bar moves.
- (3) The selector plate rotates.
- (4) The position of the selector plate is set by the selector spring.
- (5) Pin A which is attached to the tip of the selector plate positions the tone arm during auto-in.

1.2 Auto-in

- (1) Set the operation lever to "START-CUT".
- (2) The operation switch S3 turns to ON and the platter drive motor and mechanism drive motor rotate.
- (3) The platter and the motor cam rotate.
- (4) The switch lever (U) is pushed up by the rotation of the motor cam.
- (5) The motor cam switch S1 is turned to ON by the switch lever (U).
(Since the motor cam switch S2 is in the ON position, the operation switch S3 and the motor cam switch S1 are in series, it is necessary to hold the operation lever by hand until S1 turns to ON.)
- (6) The lever moves.
- (7) The operation plate rotates by means of the lever.
- (8) The pressure board starts riding up on the convex part of the operation plate.
- (9) The rubbing board is pushed up by the rubbing spring attached to it.
- (10) The rubbing board touches the guard plate.
- (11) The pressure board rides up onto the top of the convex part of the operation plate by the rotation of the operation plate.
- (12) The rubbing spring flexes, and pressure is applied to the guard plate via the rubbing board.
(Since the guard plate and the tone arm are fixed together, movement of the tone arm is controlled by this pressure.)
- (13) The claw pushes pin B on the following plate.
- (14) When pin B of the following plate is pushed, the tone arm starts moving.
Relative positions of pin B on the following plate and the tone arm can be adjusted by the auto-in adjust screw and fine adjustment of the stylus lowering point.
- (15) The claw runs against pin A on the selector plate.
- (16) Movement of the tone arm stops (The stylus comes above the auto-in position.)
- (17) The claw turns round and is disengaged.
- (18) The set lever A is pushed up by the convex part 1 of the motor cam.
- (19) The pressure board starts to descend from the top of the convex part of the operation plate, and the pressure applied to the guard plate lessens.
- (20) The tip of the push rod (Push rod cap B) starts descending the slope of the operation plate.
- (21) The guide cam and the set lever are released from the set lever A. (In preparation for auto-return.)
- (22) The claw runs against pin C on the unit plate and turns round again. (The claw is prepared for auto-return, by this action.)
- (23) The arm guide lowers by the lowering of the push rod. (The push rod lowers slowly by the damping action of oil in the push rod base.)
- (24) The arm guide lowers, and the tone arm lowers onto the record.
- (25) The tip of the muting switch enters the concave part 1 of the motor cam, turning the switch to OFF.
The muting switch turns to OFF, the cartridge output circuit conducts, and sound is generated.
- (26) The switch lever D enters the concave part 2 of the motor cam.
- (27) The motor switch S2 turns to OFF.
- (28) The power source for the mechanism driving motor is shut off and the motor stops.
- (28) The power source for the mechanism driving motor is shut off and the motor stops rotation.

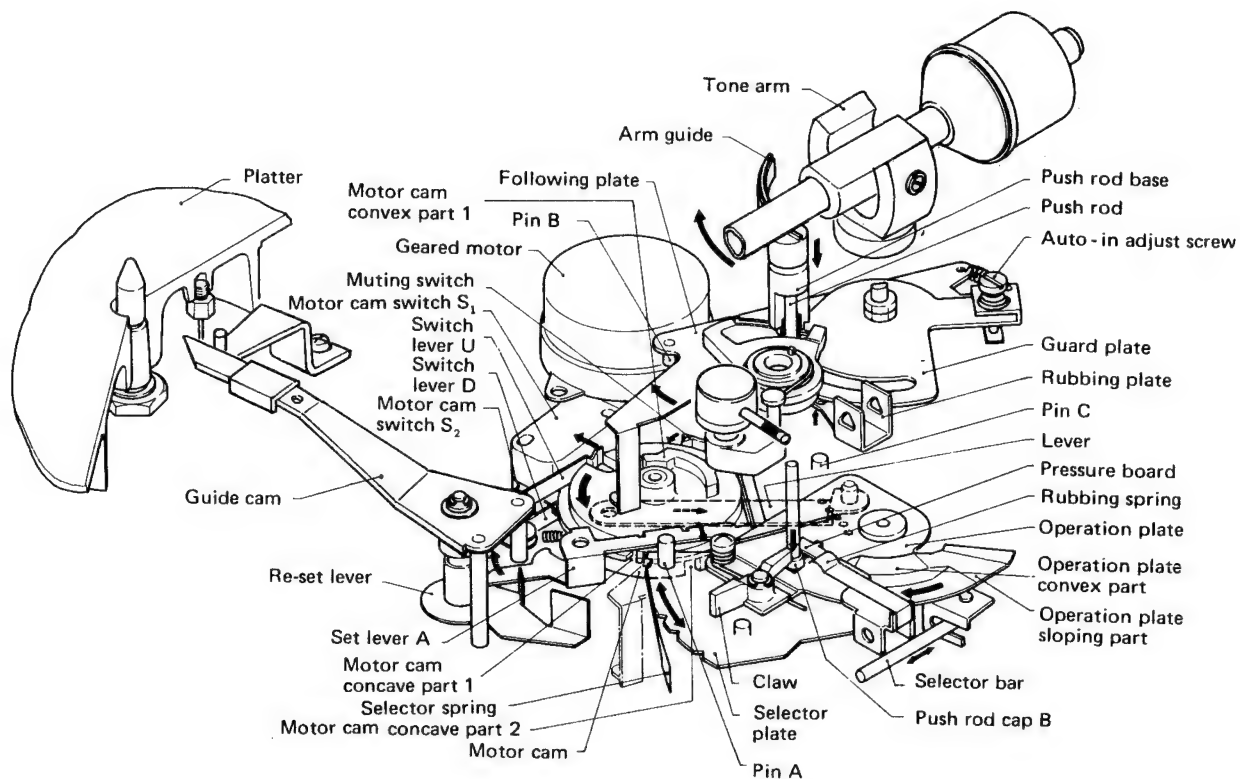


Fig. 20

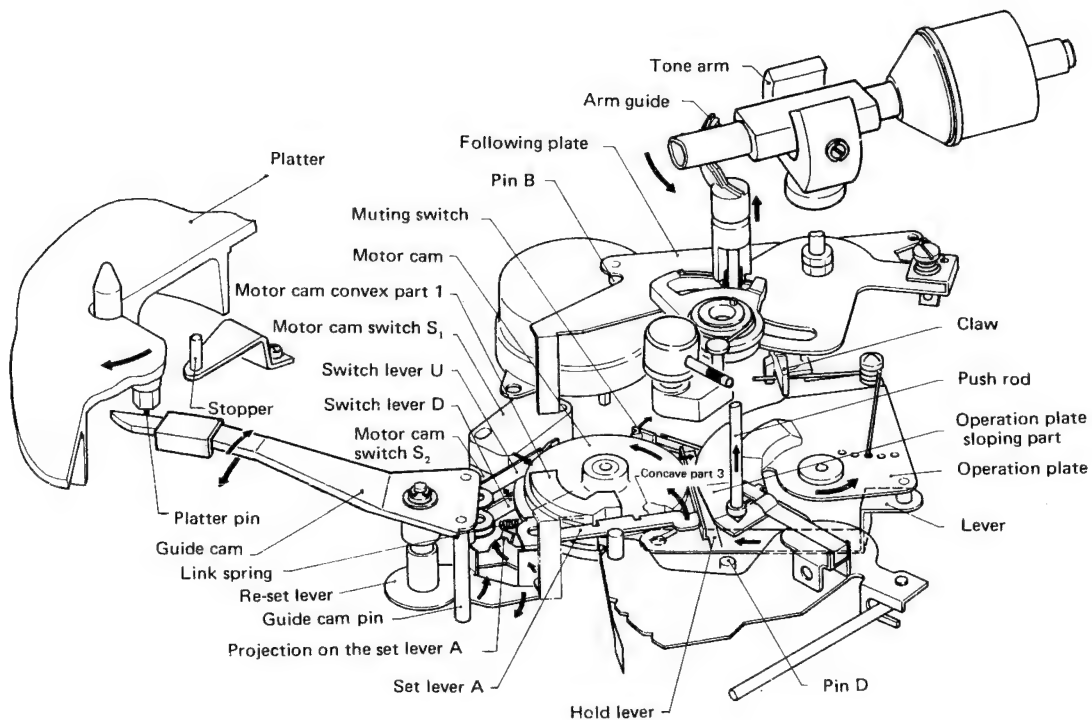


Fig. 21

1.3 Auto-return

- (1) The stylus advances to the inner part of the record and enters the lead-out groove.
- (2) The tip of the following plate pushes the rest lever.
- (3) The guide cam rotates by means of the rotation of the re-set lever.
- (4) When the guide cam rotates more than is rated, the platter pin attached to the platter is caught by the platter pin attached to caught by the tip of the guide cam.
- (5) The guide cam rotates by means of the platter pin.
- (6) The re-set lever rotates by means of the guide cam pin.
- (7) The set lever A rotates.
- (8) The projection on the set lever A pushes the switch lever D.
- (9) The switch lever D is pushed and the motor cam switch S2 turns to ON.
- (10) The tip of the set lever A connects with the hold lever.
- (11) The switch lever D keeps the mode being pressed, and S2 is kept in the ON position.
- (12) Since S2 is turned to ON, the motor starts
- (12) Since S2 is turned to ON, the motor starts rotation.
- (13) The motor cam rotates.
- (14) The tip of the muting switch is pushed out from the concave part 1 of the motor cam.
- (15) The muting switch turns to ON and the cartridge output circuit is short-circuited.
- (16) The operation plate rotates via the lever.
- (17) The push rod ascends the slope of the operation plate.
- (18) The arm guide rises and the stylus lifts from the record.
- (19) The claw pushes pin B on the following plate.
- (20) The tone arm moves to the rest.
- (21) The hold lever is pushed up by the convex part 1 of the motor cam and the hold lever and the set lever A are disconnected.
- (22) The motor cam rotates further and the set lever A comes away from the convex part 1.
- (23) The set lever A rotates by means of the projection of the link spring.
- (24) The switch lever D is no longer pressed by the projection of the set lever A.
(The switch lever D is being pressed to the side of the motor cam, so the motor cam switch S2 continues in the ON mode.)
- (25) The re-set lever and the guide cam rotate by means of the rotation of set lever A.
- (26) Rotation of (25) is stopped by the stopper.
(The re-set lever and the guide cam now assume the pre-set mode.)
- (27) The tone arm returns to the rest and movement of the tone arm stops.
- (28) Movement of pin B on the following plate stops.
- (29) The claw turns round.

- (30) The claw runs against pin D on the unit plate, and turns round again.
(With this action, the claw is prepared for auto-in.)
- (31) The switch lever U enters the concave part 3 of the motor cam.
- (32) The motor cam switch S1 enters OFF mode.
- (33) The platter drive motor and the mechanism drive motor stop, and the sequence finishes.

1.4 Auto-cut

- (1) Set the operation lever to START·CUT.
- (2) The operation switch turns to ON and the mechanism drive motor rotates.
- (3) When the switch lever D is pressed, the motor cam switch S2 turns to ON.
(It is necessary to hold the operation lever by hand until S2 turns to ON, the same as for auto-in.)
- (4) Same as in items (13)–(24) of auto-return.
- (5) The re-set lever and the guide cam enters the pre-set mode by means of the rotation of the set lever A.
- (6) The following items are the same as in the subsequent items to (27) of Auto-return.

1.5 Auto-repeat

- (1) Set the operation lever to REPEAT.
- (2) The operation switch S4 turns to ON, and the platter drive motor and the mechanism drive motor rotate.
- (3) Then, the same operations as described in items (3)–(28) of Auto-in are performed.
- (4) The sequence finishes and the operations described in items (1)–(32) are performed.
- (5) Even when the auto-return (32) operation is performed and the motor cam switch S1 turns to OFF, the mechanism drive motor continues to rotate and the operations described in items subsequent to (3) of Auto-in are performed, because S4 is ON.
When the sequence has started with the operation lever kept at START·CUT and then changed over to REPEAT at some point in the playing, the auto-repeat operation can be performed.

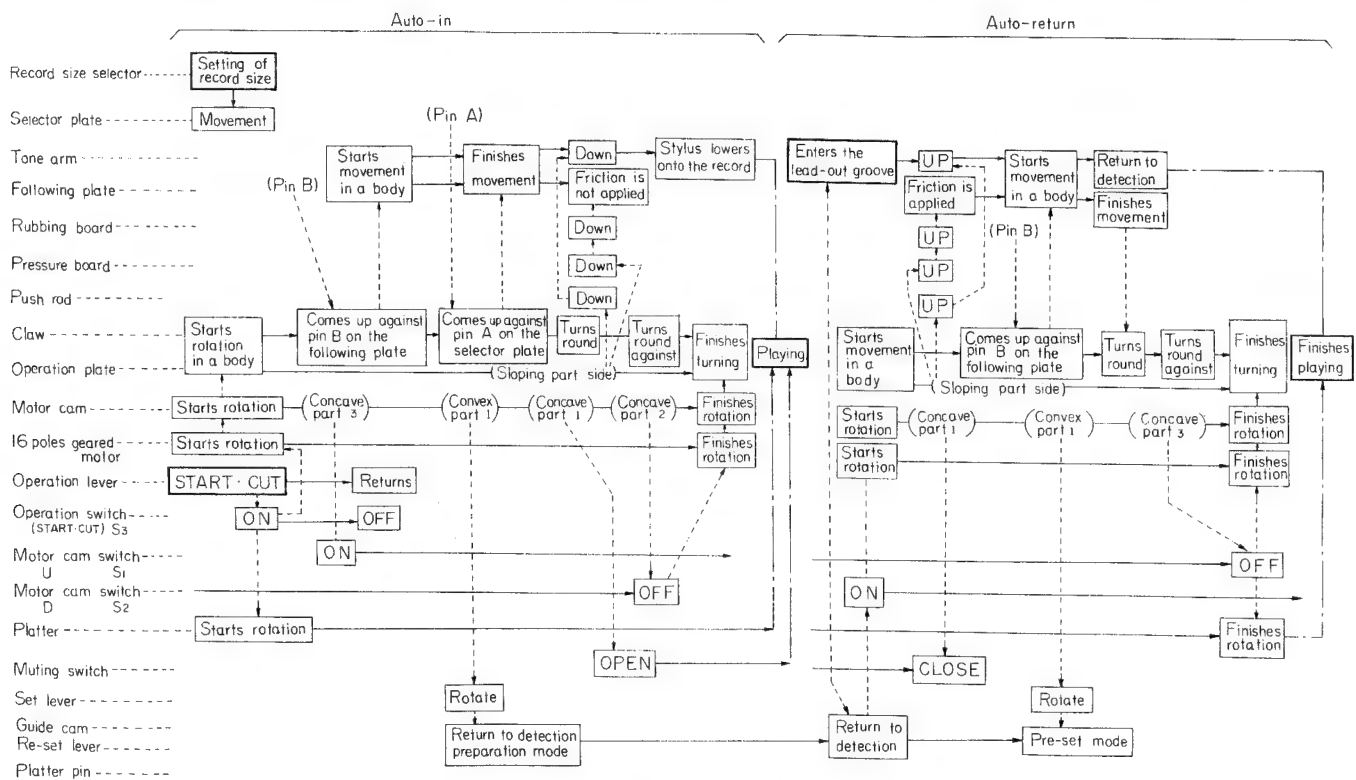
1.6 Manual

- (1) Set the record size selector to MANUAL.
- (2) Move the tone arm, by hand, to the desired position on the record.
- (3) By setting the operation lever to START·CUT, the same operation as for auto-in is performed. However, since pin A on the selector plate is positioned near the arm rest, the claw is turned round by pin A on the selector plate before the claw touches pin B on the following plate and the tone arm does not move.

1.7 Operation order of the switches


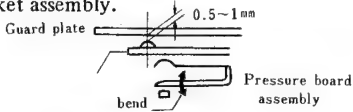
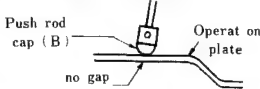
	Auto-in	Auto-return	Auto-cut	Auto-in	Repeat Auto-return	Auto-in
Motor cam switch (U) S_1	$\frac{2}{\text{ON}}$	$\frac{3}{\text{OFF}}$	$\frac{5}{\text{OFF}}$	$\frac{2}{\text{ON}}$	$\frac{7}{\text{OFF}}$	$\frac{8}{\text{ON}}$
Motor cam switch (D) S_2	$\frac{5}{\text{OFF}}$	$\frac{1}{\text{ON}}$	$\frac{3}{\text{ON}}$	$\frac{4}{\text{OFF}}$	$\frac{5}{\text{ON}}$	$\frac{10}{\text{OFF}}$
Operation switch (START-CUT) S_3	$\frac{1}{\text{ON}}$ $\frac{3}{\text{OFF}}$		$\frac{1}{\text{ON}}$ $\frac{4}{\text{OFF}}$			
Operation switch (REPEAT) S_4				$\frac{1}{\text{ON}}$		
Muting switch	$\frac{4}{\text{OFF}}$	$\frac{2}{\text{ON}}$	$\frac{2}{\text{ON}}$	$\frac{3}{\text{OFF}}$	$\frac{6}{\text{ON}}$	$\frac{9}{\text{OFF}}$

OPERATION BLOCK DIAGRAM OF FULL AUTOMATIC MECHANISM

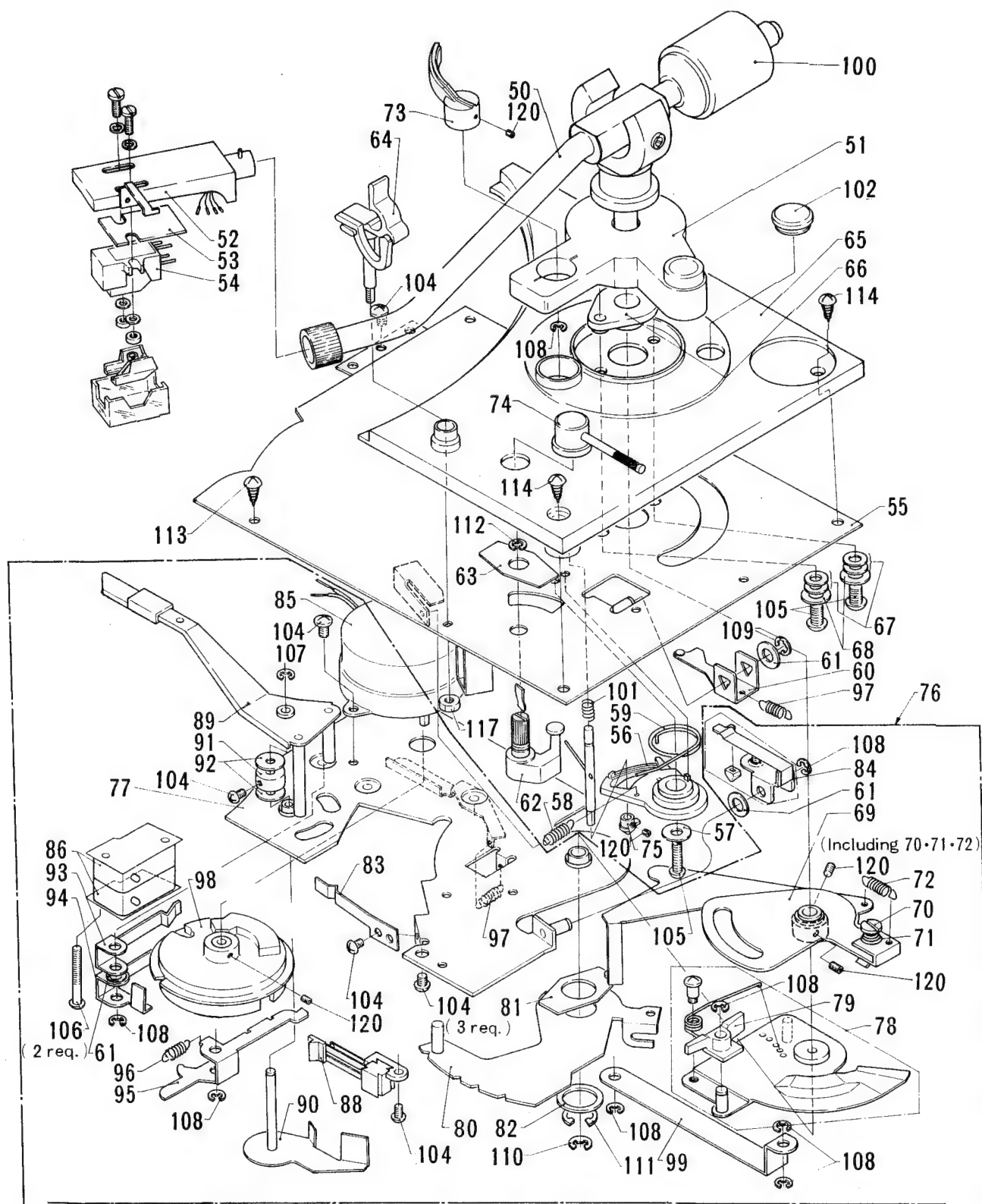


Use this diagram together with the operation diagram

TROUBLESHOOTING

Phenomena	Cause	Remedy
1. Auto-in operation 1.1 When the operation lever is set to START-CUT, the tone arm does not perform auto-in.	1. Holding time of the START-CUT lever is too short. 2. The tone arm is clamped to the rest. 3. The claw has turned round. 3.1 Too much stylus pressure 3.2 Too much friction applied to the arm 3.3 Reversal spring is weak. 4. The operation plate does not move. 4.1 The claw is caught by the pin. 4.2 The pressure board assembly is caught under the projection of the push rod cap (B).	1. Hold the START-CUT lever for about 0.5 sec. 2. Remove the clamp from the arm. 3.1 Adjust the stylus pressure. 3.2 Adjust the friction (Item 7, Page 7) 3.3 Change the reversal spring position. 4.1 Erroneous assembling: correct the position. <div style="text-align: right;">  <p>(At the position, to which operation plate is turned clockwise fully.)</p> </div> 4.2 Re-set on the projection
1.2 The tone arm moves but does not lower onto the record.	1. The push rod is caught.	1. Replace the sub bed assembly
1.3 Immediately returns after auto-in operation	1. The operation lever (switch lever does not return to "—"). 2. The motor cam switch S ₂ does not turn to OFF.	1. Replace the control cam or moderation spring. 2. Replace the motor cam switch S ₂ or switch lever D.
1.4 The tone arm slide on a slant when the stylus lowers onto the record.	1. Stylus is too high. 2. Timing of friction pressure applied is delayed. 3. Too much anti-skating is applied.	1. Bend the pressure board as shown in the figure below. 2. Bend the pressure board as shown in the figure below. 3. Align the graduation of the anti-skating to the correct position, or replace the base bracket assembly. <div style="text-align: center;">  </div>
2. Auto-return operation 2.1 Does not perform auto-return operation	1. The record is not of IEC standard. 2. Poor adjustment of auto-return position. 3. Record badly positioned. 4. The motor cam switch S ₂ does not turn to ON.	1. Set the operation lever to START-CUT. 2. Adjust the auto-return. 3. Move the relative positions of the platter and record. 4. Replace the guide cam assembly, re-set lever assembly and switch lever D.
2.2 Does not perform auto-return operation or the tone arm does not return to the rest when it rises from the record.	1. The claw has turned round. 2. The operation plate does not move.	1. } Same as in the auto-in operation. 2. }
3. Auto-repeat operation The arm returns to the rest but does not perform auto-in operation.	1. The operation switch S ₄ is poor. 2. The motor cam switch D is poor.	1. Replace the operation switch. 2. Replace the motor cam switch D.
4. Auto-cut operation Return operation is not done even when the operation lever is set to START-CUT.	1. Holding time of the START-CUT lever is too short. 2. The operation switch S ₃ is poor.	1. Hold the START-CUT lever for about 0.5 sec. 2. Replace the operation switch.
5. Other operation-related The stylus rubs the record during auto-in or auto-return.	1. Height of the arm guide is not adequate. 2. The push rod B rises up.	1. Adjust the height of the arm guide. (Refer to Item 4, Page 7, Service manual) 2. Set the unit to the mode before playing, the lifter lever to the UP position, and adjust so that there is no gap between the operation plate and push rod cap (B). <div style="text-align: center;">  </div>
6. Audio-related Sound does not come out or sound comes out only from one side.	The contact point of the muting switch is closed.	Adjust the gap between the contact point of the muting switch to 0.5 – 1.0 mm.

EXPLODED VIEW (Automatic mechanism)



EXPLODED VIEW (Without automatic mechanism)

(Nos. are reference Nos. of parts list)

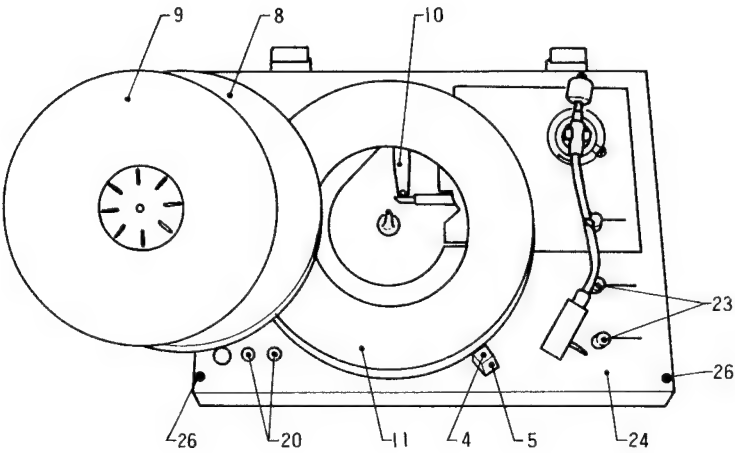


Fig. 22 Abb. 22

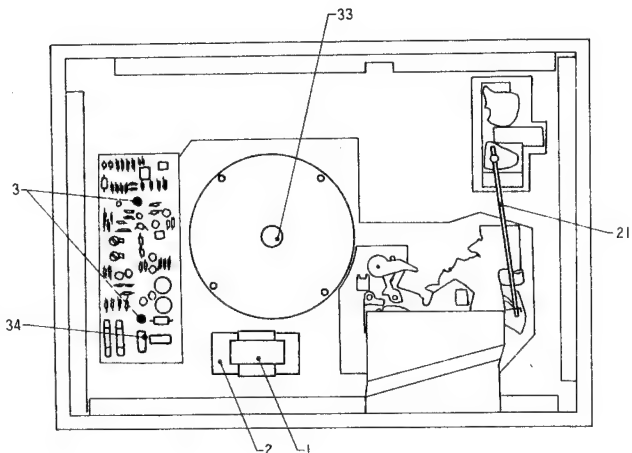


Fig. 24 Abb. 24

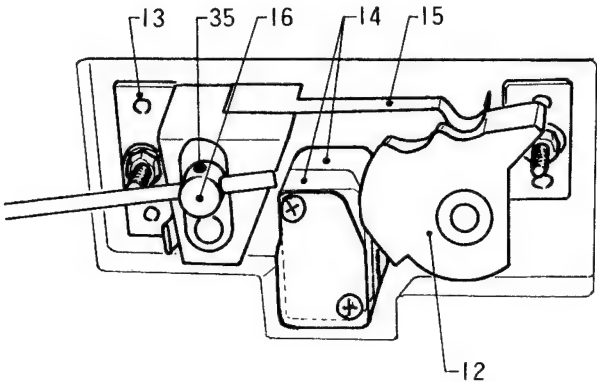


Fig. 25 Abb. 25

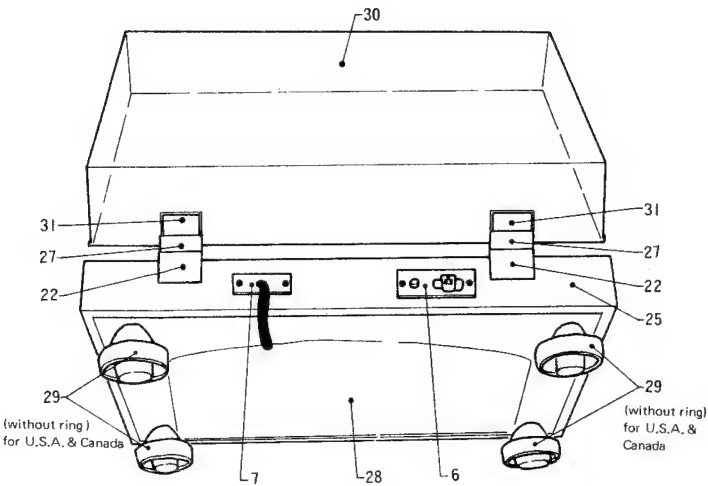


Fig. 23 Abb. 23

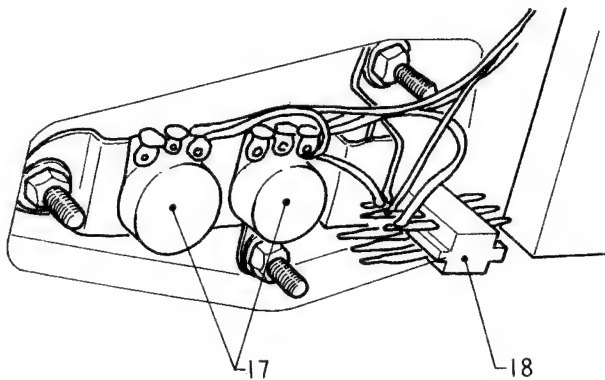


Fig. 26 Abb. 26

REPLACEMENT PARTS LIST · ERSATZTEILLISTE · TABLEAU DES PIÈCE

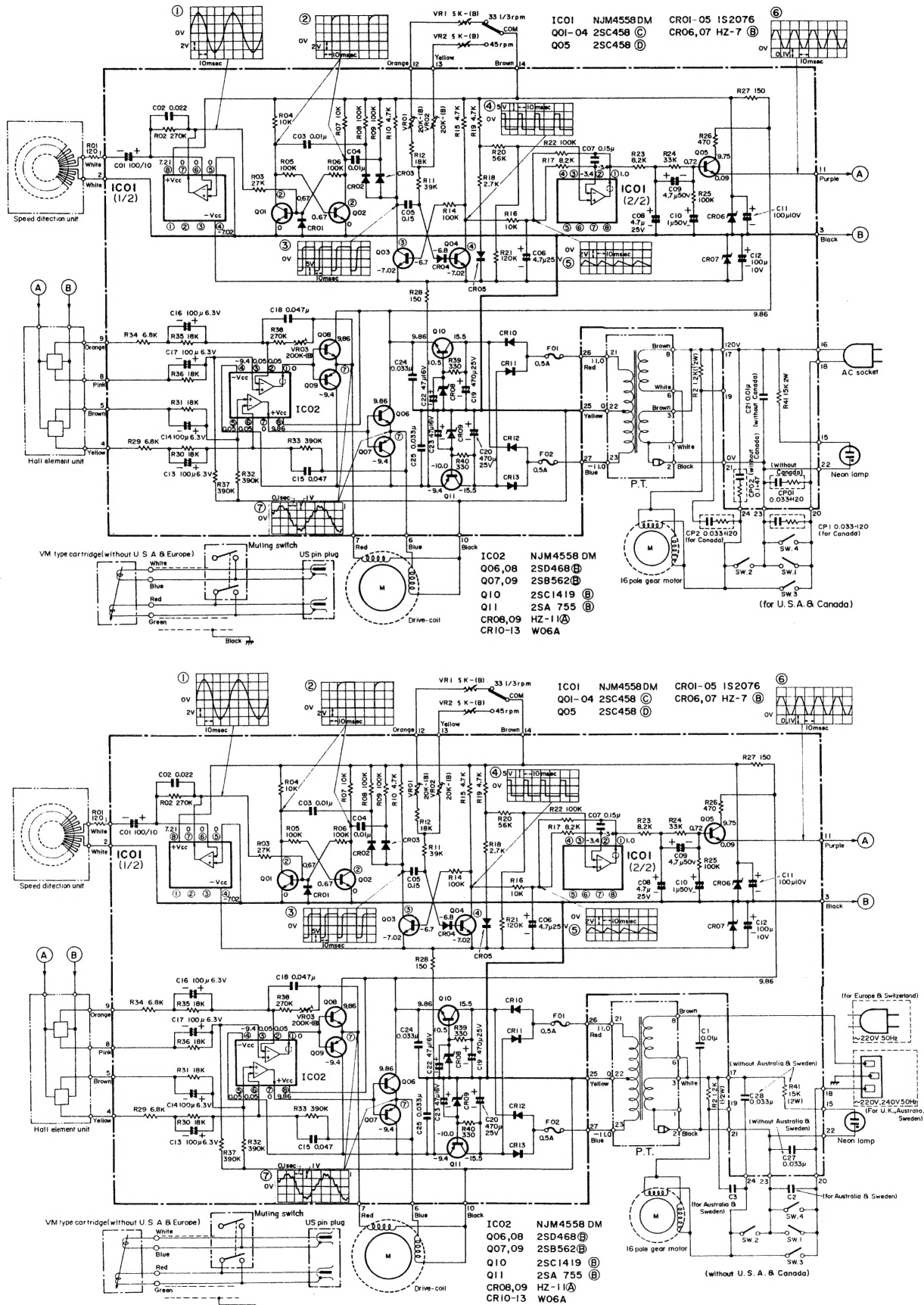
SYMBOL NO.		STOCK NO.		DESCRIPTION		SYMBOL NO.		STOCK NO.		DESCRIPTION	
CAPACITORS											
C01	0252331	Electrolytic	100μF		10V	R23	0114183	Carbon, film	8.2kΩ	±5%	SRD¼P
C02	0245018	Ceramic, discal	0.022μF	+80% -20%	25V	R24	0114213	Carbon, film	33kΩ	±5%	SRD¼P
C03	0245017	Ceramic, discal	0.01μF	+80% -20%	25V	R25	0114281	Carbon, film	100kΩ	±5%	SRD¼P
C04	0245017	Ceramic, discal	0.01μF	+80% -20%	25V	R26	0134364	Composition	470Ω	±10%	RC½GF
C05	1276212	Mylar, film	0.15μF	±5%	50V	R27	0114135	Carbon, film	150Ω	±5%	SRD¼P
C06	0252605	Electrolytic	4.7μF		25V	R28	0114135	Carbon, film	150Ω	±5%	SRD¼P
C07	1276212	Mylar, film	0.15μF	±5%	50V	R29	0114181	Carbon, film	6.8kΩ	±5%	SRD¼P
C08	0252605	Electrolytic	4.7μF		25V	R30	0114207	Carbon, film	180kΩ	±5%	SRD¼P
C09	0252815	Electrolytic	4.7μF		50V	R31	0114207	Carbon, film	180kΩ	±5%	SRD¼P
C10	0252811	Electrolytic	1μF		50V	R32	0114295	Carbon, film	390kΩ	±5%	SRD¼P
C11	0252331	Electrolytic	100μF		10V	R33	0114295	Carbon, film	390kΩ	±5%	SRD¼P
C12	0252331	Electrolytic	100μF		10V	R34	0114181	Carbon, film	6.8kΩ	±5%	SRD¼P
C13	0252331	Electrolytic	100μF		10V	R35	0114207	Carbon, film	18kΩ	±5%	SRD¼P
C14	0252331	Electrolytic	100μF		10V	R36	0114207	Carbon, film	18kΩ	±5%	SRD¼P
C15	0275015	Mylar, film	0.047μF	±10%	50V	R37	0114295	Carbon, film	390kΩ	±5%	SRD¼P
C16	0252331	Electrolytic	100μF		10V	R38	0114291	Carbon, film	270kΩ	±5%	SRD¼P
C17	0252331	Electrolytic	100μF		10V	R39	0114143	Carbon, film	330Ω	±5%	SRD¼P
C18	0275015	Mylar, film	0.047μF	±10%	50V	R40	0114143	Carbon, film	330Ω	±5%	SRD¼P
C19	0252635	Electrolytic	470μF		25V	R41	0119563	Metal, oxide	15kΩ	±10%	RD2PA
C20	0252635	Electrolytic	470μF		25V	(without Australia)					
C21	0243877	Ceramic, discal	0.01μF	+80% -20%	25V	(without printed wiring board)					
						R1	0119563	Metal, oxide	15kΩ	±10%	RD2PA
						(for Australia)					
C22	0252525	Electrolytic	47μF		16V	R2	0134374	Composition	1.2kΩ	±10%	RC½GF
C23	0252525	Electrolytic	47μF		16V	ICs & TRANSISTORS					
C24	0275014	Mylar, film	0.033μF	±10%	50V	Q01	2320063	2SC458	Ⓒ		
C25	0275014	Mylar, film	0.033μF	±10%	50V	Q02	2320063	2SC458	Ⓒ		
C27	0261204	Ceramic, discal	0.033μF	±20%	250V	Q03	2320063	2SC458	Ⓒ		
						Q04	2320063	2SC458	Ⓒ		
C28	0261204	Ceramic, discal	0.033μF	±20%	250V	Q05	2320064	2SC458	Ⓓ		
						Q06	2328002	2SD468	Ⓑ		
						Q07	2327992	2SB562	Ⓑ		
						Q08	2328002	2SD468	Ⓑ		
C1	0261201	Metalized paper	0.01μF	±20%	250V	Q09	2327992	2SB562	Ⓑ		
						Q10	2327592	2SC1419	Ⓑ		
C1	0243887	Metalized paper	0.01μF	±20%	250V	Q11	2327722	2SA755	Ⓑ		
						IC01	2367222	NJM4558DM			
C2	0261204	Metalized paper	0.033μF	±20%	250V	IC02	2367222	NJM4558DM			
						DIODES					
C2	0214479	Oil	0.033μF	±20%	450V	CR01	2337011	1S2076			
						CR02	2337011	1S2076			
C3	0261204	Metalized paper	0.033μF	±20%	250V	CR03	2337011	1S2076			
						CR04	2337011	1S2076			
C3	0214479	Oil	0.033μF	±20%	450V	CR05	2337011	1S2076			
						CR06	2327732	HZ-7	Ⓑ		
						CR07	2327732	HZ-7	Ⓑ		
						CR08	2337321	HZ-11	Ⓐ		
						CR09	2337321	HZ-11	Ⓐ		
						CR10	2337081	W06A			
						CR11	2337081	W06A			
						CR12	2337081	W06A			
						CR13	2337081	W06A			
						VARIABLE RESISTORS					
						VR01	0151281	20kΩ - (B)			
						VR02	0151281	20kΩ - (B)			
						VR03	0151285	200kΩ - (B)			
						MISCELLANEOUS					
R01	0114133	Carbon, film	120Ω	±5%	SRD¼P	CP01	0269016	CR multiple component (for U.S.A.)			
R02	0114291	Carbon, film	270kΩ	±5%	SRD¼P	CP02	0269017	CR multiple component (for U.S.A.)			
R03	0114211	Carbon, film	27kΩ	±5%	SRD¼P	F01,02	2727197	Fuse-500mA (for Europe)			
R04	0114201	Carbon, film	10kΩ	±5%	SRD¼P	F01,02	2727015	Fuse-0.5A (for U.S.A. & Canada)			
R05	0114281	Carbon, film	100kΩ	±5%	SRD¼P	without printed wiring board					
R06	0114281	Carbon, film	100kΩ	±5%	SRD¼P	CP1	0269018	CR multiple component (for Canada)			
R07	0114201	Carbon, film	10kΩ	±5%	SRD¼P	CP2	0269018	CR multiple component (for Canada)			
R08	0114281	Carbon, film	100kΩ	±5%	SRD¼P						
R09	0114281	Carbon, film	100kΩ	±5%	SRD¼P						
R10	0114177	Carbon, film	4.7kΩ	±5%	SRD¼P						
R11	0118800	Metal	39kΩ	±2%	RN¼B						
R12	0114207	Carbon, film	18kΩ	±5%	SRD¼P						
R14	0114281	Carbon, film	100kΩ	±5%	SRD¼P						
R15	0114177	Carbon, film	4.7kΩ	±5%	SRD¼P						
R16	0114201	Carbon, film	10kΩ	±5%	SRD¼P						
R17	0114183	Carbon, film	8.2kΩ	±5%	SRD¼P						
R18	0114171	Carbon, film	2.7kΩ	±5%	SRD¼P						
R19	0114177	Carbon, film	4.7kΩ	±5%	SRD¼P						
R20	0114219	Carbon, film	56kΩ	±5%	SRD¼P						
R21	0114281	Carbon, film	100kΩ	±5%	SRD¼P						
R22	0114281	Carbon, film	100kΩ	±5%	SRD¼P						

Note: Parts not shown in the Stock NO. are unavailable.

SYMBOL NO.	STOCK NO.	DESCRIPTION	SYMBOL NO.	STOCK NO.	DESCRIPTION
for ACCESSORY			AUTO MECHANISM		
	0996096	Service driver (for U.S.A.)	50	2543571	Tone arm assembly
	0044065	EP adapter	51	3923101	Base bracket assembly
	2747902	Earth cord assembly	52	2543542	Head shell assembly
	2748561	DIN cord (for Europe & Sweden)	53	4376993	Weight plate (without U.S.A., Sweden)
WITHOUT AUTO MECHANISM			54	2552541	Cartridge (VFS-261) Switzerland & Europe)
1	2218351	Power Transformer	55	4388956	Sub bed assembly
2	4684231	Spacer	56	3917691	Cueing cam (R) assembly
3	4389423	Spacer	57	0645587	Special washer
4	2767341	Neon lamp	58	3338237	Cueing spring
5	3922713	Lamp case	59	3338862	Lifter spring (B)
	2748441	AC power cord (for U.S.A. & Canada)	60	4389391	Rubbing board assembly
	2748651	AC power cord (for Sweden)	61	4380611	Washer
	2748311	AC power cord (for Australia)	62	3921012	Lifter cam
	2748511	AC power cord (for Europe)	63	3338802	Cycle plate spring
	2747771	AC power cord (for Switzerland)	64	3921154	Rest holder assembly
	2748251	AC power cord (for U.K.)	65	3922582	Bed cover
6	2657191	3P AC socket (for Sweden, Australia & U.K.)	66	4683512	Pickup rubber washer
7	2748054	Phono cord with stopper	67	4683521	Rubber washer
8	4785102	Platter	68	4129671	Washer (S)
9	4682752	Platter mat (without U.S.A. & Canada)	69	4388832	Follow-up plate assembly
	4682753	Platter mat (for U.S.A. & Canada)	70	4567041	Adjust screw
10	4393051	Stopper assembly	71	3338501	Adjust spring
11	4397531	Platter decorative edge	72	3338367	Link spring
12	3920947	Control cam	73	3921051	Arm guide
13		Control plate	74	4571211	Cueing knob assembly
14	2787435	Microswitch	75	3921311	Push rod cap (B)
15	3338781	Moderation board spring	76	4394632	Full automatic mechanism assembly
16	4388553	Selector lever assembly	77	4388811	Unit plate assembly
17	0151842	Variable resistor (5k Ω -B)	78	4388821	Motion plate assembly
18	4981161	Push switch (with knob)	79	3920951	Claw
19	0043793	Bushing (for AC power cord) (for U.S.A. & Canada)	80	4388591	Selector plate assembly
	3913001	Bushing (for AC power cord) (for Europe & Switzerland)	81	3338803	Board spring
20	4871241	Pitch control knob	82	4380614	Washer
21	4388732	Selector bar	83	3338814	Selector spring
22	3923651	Hinge cover	84	4388612	Pressure board assembly
23	4571381	Switch knob assembly	85	2522322	16 poles gear motor
24	4394112	Aluminium panel assembly	86	2787437	Micro switch
25	9303074	Cabinet assembly (Rose) (for U.S.A. & Canada)	88	2787422	Leaf switch
	9303075	(Black) (for Europe, Sweden, Swiss)	89	4393021	Guide cam assembly
	9303081	(Walnut) (for U.K.)	90	4388642	Reset lever assembly
26	4682621	Cushion	91	4570432	Guide cam support
27	4394281	Hinge	92	4380611	Washer
28	9314072	Bottom board assembly (with insulator) (for U.S.A. & Canada)	93	4388661	Switch lever - (U)
	9314073	Bottom board assembly (with insulator) (without U.S.A. & Canada)	94	4388672	Switch lever - (D)
29	4683952	Insulator (without U.S.A. & Canada)	95	4388681	Set lever - (A)
	4683951	Insulator (without ring) (for U.S.A. & Canada)	96	3338364	Link spring
30	3921745	Dust cover assembly	97	3338771	Lever spring
31	4391201	Lock plate	98	3921771	Motor cam assembly
33	2522331	Direct drive motor	99	4388701	Transmitting lever
34	2505636	Control printed wiring board assembly (for U.S.A.)	100	4571711	Main weight
	2505637	Control printed wiring board assembly (for Europe)	101	3338093	Push rod spring
	2505638	Control printed wiring board assembly (for Australia)	102	4682812	Cap
	2506281	Control printed wiring board assembly (for Canada)		4567412	3 ϕ x 8CT bind screw
	2506282	Control printed wiring board assembly (for Sweden)		4567411	3 ϕ x 6CT bind screw
35	4561993	3 ϕ screw (with hexagonal hole)		4567415	3 ϕ x 14CT bind screw
36	4513311	Earth screw		4567418	3 ϕ x 25CT bind screw
	3925011	Lamp case sheet		4391214	2 ϕ E ring
	4567411	3 ϕ x 8CT bind screw		4391215	2.5 ϕ E ring
	4567412	3 ϕ x 8CT bind screw		4391216	3 ϕ E ring
	4567422	4 ϕ x 8CT bind screw		4391218	5 ϕ E ring
	4567453	3 ϕ x 10CT bind screw		4391222	8 ϕ E ring
	4567418	3 ϕ x 25CT bind screw		4391217	4 ϕ E ring
	4770254	3 ϕ flanged nut			3.1 ϕ x 10 wood screw
	4770255	4 ϕ flanged nut			3.1 ϕ x 16 wood screw
	4391217	4 ϕ E ring			3 ϕ nut
	4784181	4 ϕ flanged nut (for Aluminium panel fixing)		4570541	2.6 ϕ x 10CT cartridge screw (without U.S.A.)
	3900082	Switch spacer		4566044	2.6 ϕ cartridge nut (without U.S.A.)
	2687311	6P terminal (without U.S.A.)		4373671	2.6 ϕ cartridge washer (without U.S.A.)
				4373672	2.6 ϕ cartridge washer (L) (without U.S.A.)
			120	4561993	3 ϕ screw (with hexagonal hole)
				3900082	Switch spacer



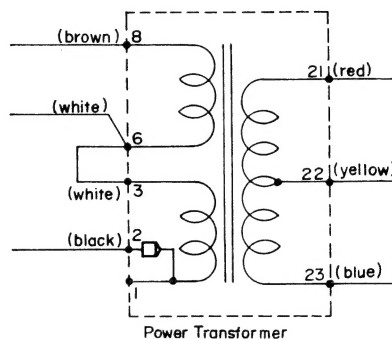
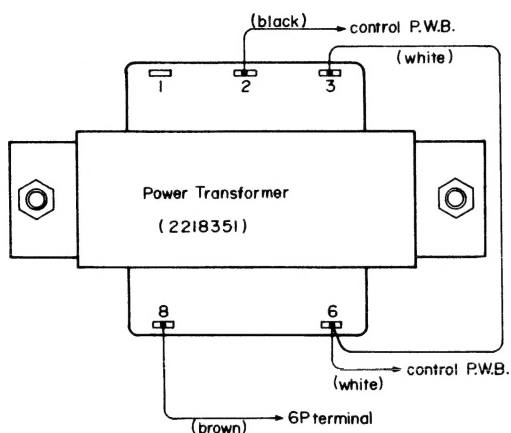
CIRCUIT DIAGRAM · SCHALTPLAN · PLAN DE CIRCUIT



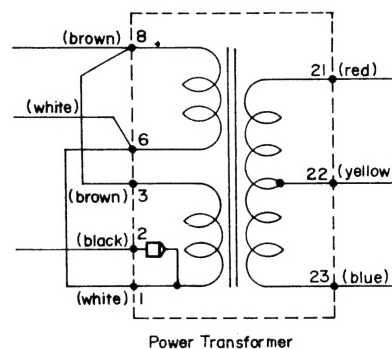
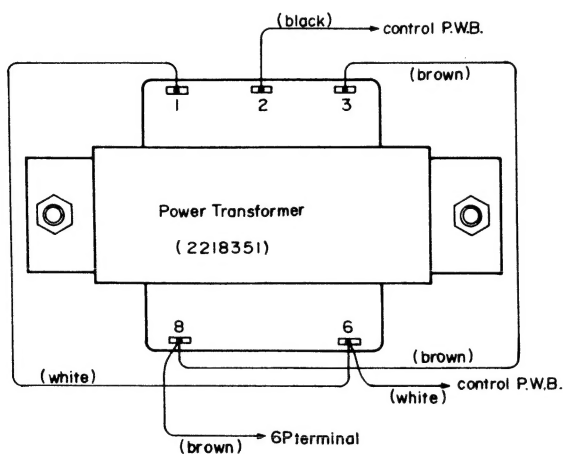
HOW TO CHANGE THE VOLTAGE

The power supply voltage of this set is AC 200V–240V 50Hz. When using in the AC 100V–130V area, refer changing to qualified service personnel.

AC 200V - 240V Connection



AC 100V-130V Connection



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